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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,904	07/21/2003	Kenneth E. Welker	2088.002800/14.0246	7670

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EXAMINER
HUGHES, SCOTT A

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/623,904	WELKER ET AL.
	Examiner	Art Unit
	Scott A Hughes	3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/31/2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-17,19-24,26-29,31-34 and 36* is/are rejected.

7)☒ Claim(s) *5,6,18,25,30 and 35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *7/21/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 1/31/2006 have been fully considered but they are not persuasive. Applicant argues that it would not be obvious, in view of Stephen, to modify the Bary reference (teaching seismic sensors and inclinometers) to include the sensor units in a seismic cable. Applicant argues that there is no motivation in the prior art to couple the sensor units described by Bary with an ocean bottom cable because the sensor units of Bary are intended to descend freely through the water and not to be impeded by attachment to a cable. This argument is not persuasive because although Bary discloses that the sensors descend freely to the bottom, the sensors still perform the function of obtaining ocean bottom seismic data for a desired survey area. Bary discloses that the sensors descend to the bottom in certain areas, and that their positions are determined for the purpose of performing a seismic survey of the area beneath the sensors. Ocean bottom seismic cables, as taught by Stephen, also include sensors that rest on the bottom in a desired area and obtain seismic data about the area. Therefore, the sensors disclosed by Bary would perform the same function of sensing ocean bottom seismic data whether they fall to position in a desired survey area or if they are part of a seismic cable that is laid out in a seismic survey area.

Applicant's argument that there is no teaching in Bary or Stephen of coupling sensors to an ocean bottom cable in order to be able to lay down the sensor units on the seafloor in a desired array from a survey vessel, as suggested as motivation for combining by the examiner, is not persuasive since Stephen teaches this. The benefit

of having sensors in a seismic cable in order to be able to lay down the sensor units on the seafloor in a desired array is taught by Stephen (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). This gives the benefit of the sensors being at known locations, as opposed to the location determination that is done for the sensors of Bary.

Applicant's argument that Bary and Stephen do not teach determining whether the ocean bottom cable has moved from the at least one initial inclination and the at least one current inclination is not persuasive. Applicant argues that Bary teaches that the devices are intended to be buried in the sea bottom, and that they would therefore it would be unnecessary to determine whether or not the sensors have moved. This is not persuasive because Bary teaches that perfect coupling (no movement) is required before the seismic data is taken. Bary discloses the use of inclinometers and a compass to determine the orientation, which would change if the sensors were not coupled to the bottom. Therefore, Bary discloses determining if the sensors have moved because Bary discloses determining orientation and also determining coupling and setting of the device before seismic data is taken. There is no guarantee that the sensor would not move just because it is partially or totally buried in the sea bottom. Ocean currents, tides, and changing sands could still cause the orientation and coupling of the sensor to change. Applicant argues that Stephen teaches detecting steady-state accelerations, and therefore does not determine if the sensors have moved. However, Stephen teaches that the cable must have settled before the seismic data is taken. Stephen further discloses determining the orientation of the sensors in real time, which would show a change in the orientation (Columns 2-3). Stephen discloses determining

the orientation of the cable in real time, and also discloses waiting for the cable to settle (does not move or change orientation). Therefore, applicant's arguments that Stephen only detects steady-state (not moving) orientations are not persuasive. Applicant argues that Stephen teaches that it would not be necessary to determine whether the cable has moved. This is not persuasive because Stephen teaches determining orientation in real-time (which would detect any movement) and also teaches that the cable must first settle (no longer be moving) before taking data.

For these reasons, applicant's arguments are not found to be persuasive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7-17, 19-24, 26-29, 31-34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bary in view of Stephen.

With regard to claims 1, 28, and 33, Bary discloses a method, apparatus, and a machine readable storage media that has instructions for performing the method. Bary discloses determining at least one initial inclination of at least one orientation sensor coupled to at least one ocean bottom seismic device ([0008]-[0009]; [0083]-[0089]). Bary discloses that the coupling of the state of the geophones with the bottom is checked, and that this occurs in the device with the inclinometer and compass. Bary

discloses that the seismic data acquisition is begun once the device has settled and coupled to the bottom ([0028]-[0032], [0207])). It would have been obvious to use the inclinometer and compass associated with each data acquisition module to determine the orientation of the seismic receivers. Since Bary discloses that seismic acquisition begins when the devices are set to the bottom, it would have been obvious to use the inclinometer and compass to determine orientations of the device as it settled in order to determine if the device has moved from one inclination reading to another. Bary does not disclose that the ocean bottom sensors are part of a seismic cable. Instead, the devices disclosed by Bary are individual sensors spread out over a survey area. Stephen discloses the use of seismic sensors including geophones in marine environments wherein the sensors are disposed in ocean bottom seismic cables (abstract; Column 1; Columns 3-4). Stephen discloses that the orientation of the sensors is necessary for the seismic measurements to be useful, and that the cable needs to settle before measurements can be made (Column 1, Lines 25-35). This is similar to the statements in Bary that the seismic sensors must settle before measurements are made. Therefore, the same idea of having the devices settled (position not changing) is taught by Bary for individual devices of seismic sensors and by Stephen for seismic sensor devise inside of ocean bottom cables. It would have been obvious to modify Bary to include placing the sensor units into a seismic cable as taught by Stephen instead of having them as individual units in order to be able to lay down sensors on the seafloor in a desired array from a survey vessel.

With regard to claim 2, Bary discloses re-positioning the sensors until the sensor is settled and perfectly coupled to the bottom ([0009]; [0105]). Bary discloses that the DSAU is considered installed once its position remains stable. Part of remaining stable would be the use of the inclinometer on the DSAU to make sure that the position wasn't changing by way of shifting orientations. It would have been obvious to do the same to a cable as taught by Stephen to make sure that the cable is settled.

With regard to claim 3, Bary discloses performing a position determination operation ([0009]; [0083]-[0089]; [0105]). Stephen also discloses a cable position determination (Columns 1, 4). It would have been obvious to use the position determination of Bary based on orientation of the sensors with sensors in a seismic cable as taught by Stephen.

With regard to claim 4, Bary discloses that re-positioning comprises physically moving the ocean bottom device ([0009]).

With regard to claim 7, Bary discloses performing a seismic sensing operation in response to determining that the ocean bottom device has not moved ([0207]). Stephen discloses that ocean bottom sensors in an ocean bottom cable must be settled (not moving). It would have been obvious to perform the same operation if the sensors were inside of cables as taught by Stephen instead of inside of individual units.

With regard to claim 8, Bary discloses re-calibrating a seismic coupling of the sensor to the floor of a body of water ([0083]-[0089]).

With regard to claim 9, Bary discloses at least one seismic sensor coupled to ocean bottom cable ([0084]).

With regard to claim 10, Bary discloses that the orientation sensor is coupled to the seismic sensor ([0009], [0084]).

With regard to claim 11, Bary does not disclose that the seismic sensor is capable of performing the functions of the orientation sensor. Stephen discloses that accelerometers can be used in OCB cables to determine both the orientation of the cable from steady state accelerations and also as seismic sensors that determine accelerations due to seismic waves (Column 5, Lines 45-50). It would have been obvious to modify Bary to include accelerometers to detect both orientation and seismic signals as disclosed by Stephen in order to lessen the amount of components needed in the acquisition device.

With regard to claims 12-14, Bary discloses determining the orientation after a survey is complete and at selected times during the survey ([0009]; [0105]). It would have been obvious to continue to monitor the orientation of the acquisition devices throughout the survey in order to ensure that the devices were still coupled to the bottom and had not moved.

With regard to claim 15, Bary discloses that the orientation sensor is an inclinometer and a magnetic sensor (compass) ([0009]; [0084]).

With regard to claim 16, Bary discloses a system for carrying out a seismic survey. Bary discloses at least one ocean bottom device ([0004]), at least one seismic sensor coupled to the ocean bottom device, at least one orientation sensor coupled to the ocean bottom device, and a signal processing unit capable of determining at least one initial inclination of the orientation sensor, determining a current inclination of the

orientation sensor, and determining whether the ocean bottom device has moved using the at least one initial inclination and the current inclination ([0009], [0083]-[0089]). It would have been obvious to use the inclinometer and compass associated with each data acquisition module to determine the orientation of the seismic receivers. Since Bary discloses that seismic acquisition begins when the devices are set to the bottom, it would have been obvious to use the inclinometer and compass to determine orientations of the device as it settled in order to determine if the device has moved from one inclination reading to another. Bary does not disclose that the ocean bottom sensors are part of a seismic cable. Instead, the devices disclosed by Bary are individual sensors spread out over a survey area. Stephen discloses the use of seismic sensors including geophones in marine environments wherein the sensors are disposed in ocean bottom seismic cables (abstract; Column 1; Columns 3-4). Stephen discloses that the orientation of the sensors is necessary for the seismic measurements to be useful, and that the cable needs to settle before measurements can be made (Column 1, Lines 25-35). This is similar to the statements in Bary that the seismic sensors must settle before measurements are made. Therefore, the same idea of having the devices settled (position not changing) is taught by Bary for individual devices of seismic sensors and by Stephen for seismic sensor devise inside of ocean bottom cables. It would have been obvious to modify Bary to include placing the sensor units into a seismic cable as taught by Stephen instead of having them as individual units in order to be able to lay down sensors on the seafloor in a desired array from a survey vessel.

With regard to claims 17, 29 and 34, Bary discloses that the signal-processing unit is capable of determining whether the ocean bottom sensors have moved by comparing the inclinations ([0083]-[0089]). The signal processor of the DAM disclosed by Bary would be capable of determining whether the ocean bottom sensors have moved by comparing inclinations since it contains an inclinometer and a compass, both of which record orientations of the ocean bottom sensors that could be used to determine movements of its position. It would have been obvious to modify Bary to include performing the signal processing on seismic sensors inside of an OBC as taught by Stephen in order to make sure that the cable sensors have not moved (i.e. that they are settled as taught by both Bary and Stephen) before a survey is started.

With regard to claims 19, 31, and 36, Bary discloses a plurality of orientation sensors on the ocean bottom sensors ([0009]).

With regard to claim 20, Bary discloses a first survey vessel wherein the ocean bottom cable is coupled to the vessel ([0004]).

With regard to claim 21, Stephen discloses a cable position operation (Column 1, Column 3, Line 60 to Column 4, line 8). It would have been obvious to modify Bary to include a cable position operation for using sensors in an OCB instead of individual units.

With regard to claim 22, Bary discloses performing a position determination operation ([0009]; [0083]-[0089]; [0105]). Stephen also discloses a cable position determination (Columns 1, 4). It would have been obvious to use the position

determination of Bary based on orientation of the sensors with sensors in a seismic cable as taught by Stephen.

With regard to claim 23, Bary discloses that re-positioning comprises physically moving the ocean bottom device ([0009]).

With regard to claim 24, Bary discloses that the survey vessel is capable of performing the cable positioning operation in response to a signal that the cable has moved ([0009]). Since the cable has the inclinometers and compass, there is the capability to determine movement based on orientation. The survey vessel is capable of laying the cable, and the survey vessel further includes the robot which is capable of positioning the cable until it is coupled to the bottom ([0009]).

With regard to claim 26, Bary discloses that the orientation sensor is an inclinometer ([0009]; [0084]).

With regard to claim 27, Bary does not disclose that the seismic sensor is capable of performing the functions of the orientation sensor. Stephen discloses that accelerometers can be used in OCB cables to determine both the orientation of the cable from steady state accelerations and also as seismic sensors that determine accelerations due to seismic waves (Column 5, Lines 45-50). It would have been obvious to modify Bary to include accelerometers to detect both orientation and seismic signals as disclosed by Stephen in order to lessen the amount of components needed in the acquisition device.

With regard to claim 32, Bary discloses determining a seismic coupling between the sensor and the ocean floor ([0083]-[0089]).

Allowable Subject Matter

Claims 5-6, 18, 25, 30, 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

JACK KEITH
SUPERVISORY PATENT EXAMINER